

What is claimed is:

1. An improved metallurgical powder composition, comprising:
  - (a) at least about 85 percent by weight of an atomized iron-based powder having an apparent density of between 2.75 and 4.6 g/ cm<sup>3</sup>; and
  - 5 (b) silicon carbide-containing powder present in an amount to provide from about 0.05 to about 7.5 percent by weight silicon carbide, wherein the total carbon content of the metallurgical powder composition is between about 0.015 and about 0.63 percent by weight.
2. The powder composition of claim 1, wherein the silicon carbide-containing powder  
10 is present in the metallurgical powder composition such that the silicon carbide-containing powder provides between about 0.035 and about 2.1 percent by weight silicon to the powder composition and provides between about 0.015 and about 0.63 percent by weight carbon to the powder composition.
3. The powder composition of claim 1, wherein the silicon carbide-containing powder  
15 has a particle size distribution such that it has a  $d_{50}$  value below about 10 microns.
4. The powder composition of claim 1, wherein the atomized iron-based powder has a particle size distribution such that about 50 percent by weight of the iron-based powder passes through a No. 70 sieve and is retained above a No. 400 sieve.
5. The powder composition of claim 1, wherein the silicon carbide-containing powder  
20 has a particle size distribution such that it has a  $d_{50}$  value below about 25 microns
6. A method for forming a compacted metal part from a powder metallurgical composition, comprising the steps of:
  - (a) providing an improved metallurgical powder composition, comprising:
    - (i) at least about 85 percent by weight of an atomized iron-based  
25 powder having an apparent density of between 2.75 and 4.6 g/ cm<sup>3</sup>; and

(ii) a silicon-containing powder present in an amount to provide from about 0.05 to about 7.5 percent by weight silicon carbide, and wherein the total carbon content of the metallurgical powder composition is between about 0.015 and about 0.63 percent by weight;

- 5           (b) compacting the metallurgical powder composition in a die at a pressure of between about 5 and 200 tsi to form a compacted part; and
- (c) sintering the compact part at a temperature of at least 2150°F.

7.       The method of claim 6, wherein the silicon carbide-containing powder has a particle size distribution such that it has a  $d_{50}$  value below about 25 microns